said establishing a pseudo-wire including negotiating an encapsulation label for the packet data to be transmitted between the provider edge nodes;

said tunneling packet data including utilizing the negotiated encapsulation label for the packet data.

6. The method according to claim 5, further comprising:

associating the tunneled packet data with a corresponding tunneled command message.

7. The method according to claim 6, said associating step including building a session table storing the negotiated encapsulation label for the packet data associated with the command message, the command message encapsulation label, and a control message ID.

8. A method of transporting a customer data flow including a sequence of data packets that are associated with one another over an optical network, comprising:

terminating client frames in the customer data flow holding the sequence of data packets;

appending an encapsulation label to the data packets whose client frames have been terminated;

originating an optical connection between provider edge nodes of the optical network to carry the data packets with the appended encapsulation label;

transmitting the data packets with the appended encapsulation label over the optical connection using optical signal transport framing; and

tunneling at least one command message associated with the customer data flow within the optical signal transport frame used by said transmitting step.

9. The method of transporting a customer data flow according to claim 8, said tunneling step including appending a control message encapsulation label to the at least one command message.

10. The method of transporting a customer data flow according to claim 8, said originating step including encapsulating the data packet plus appended encapsulation label in a GFP frame, packet over SONET frame or link access procedure frame.

11. The method of transporting a customer data flow according to claim 8, further comprising:

establishing a pseudo-wire directly over the optical connection and between the provider edge nodes of the communications network to carry the optical connection.

12. The method of transporting a customer data flow according to claim 8, said transmitting step using SONET, SDH, or OTN optical signal transport framing.

13. The method of transporting a customer data flow according to claim 11, wherein at a receiving end of the communications network the method further comprises:

terminating the optical connection carrying the pseudo wire;

recovering the data packets with the appended encapsulation label from the terminated optical connection; and

determining an intended physical port to send out the extracted data packet.

14. The method of transporting a customer data flow according to claim 9, wherein at a receiving end the method further comprises:

terminating the optical connection carrying the pseudo wire;

recovering packetized data from the terminated optical connection; and

determining whether the extracted packetized data are the data packets from a customer flow or command messages based on the encapsulation label.

15. The method of transporting a customer data flow according to claim 14, further comprising:

removing the encapsulation label from the data packets; and

transmitting the data packets to an intended destination based on the removed label.

16. The method of transporting a customer data flow according to claim 8, wherein the sequence of data packets in the customer data flow are layer-2 packets with or without an MPLS label.

17. The method of transporting a customer data flow according to claim 8, wherein the sequence of data packets in the customer data flow includes data packets having a gigabit Ethernet, link access procedure, Ethernet over SONET, asynchronous transfer mode, frame relay, resilient packet ring, packet over SONET format.

18. The method of transporting a customer data flow according to claim 8, further comprising:

aggregating a plurality of data flows each of which includes a sequence of data packets that are associated therewith;

said terminating step terminating client frames in each of the customer data flows;

said appending step appending a different encapsulation label to the data packets from different customer flows;

said originating an optical connection step originating an optical connection between provider edge nodes of the optical network to carry one or more of the sequences of data packets associated with the plurality of data flows;

said transmitting step transmitting the sequences of data packets with the appended encapsulation labels over the optical connection using optical signal transport framing; and

tunneling at least one command message associated with at least one of the customer data flows within the optical signal transport frame used by said transmitting step.

19. A packet processing engine for a provider edge node of an optical communications network, comprising:

a session table storing outgoing optical circuit connection identification data and encapsulation label data associated with control messages; and

a controller operatively connected to said session table, said controller looking up the data stored in said session table to determine the encapsulation label and outgoing optical circuit connection for a received control message;

said controller encapsulating the received control message with the determined encapsulation label and injecting the encapsulated control message into the determined outgoing optical circuit connection.

20. A packet processing engine for a provider edge node of a communications network according to claim 19,

wherein, for each of a plurality of the control messages, said session table stores a control message ID, the corresponding outgoing optical circuit connection identification data and a corresponding encapsulation label.

21. A packet processing engine for a provider edge node of a communications network according to claim 19, further comprising:

a packet filter receiving a data packet from a customer flow;

a packet filter table operatively connected to said packet filter, said packet filter table storing incoming data packet interface identification data, incoming packet label data, outgoing optical connection identification data, and encapsulation label data;

said packet filter reading, from the received data packet, the incoming packet interface identification data and incoming packet label data and storing this data in the packet filter table;

said packet filter using said packet filter table to determine an encapsulation label and corresponding outgoing optical connection for the received data packet; and

a packet forwarder operatively connected to said packet filter, said packet forwarder adding the determined encapsulation label to the data packet and forwarding the received data packet to the determined outgoing optical connection.

22. A packet processing engine for a provider edge node of a communications network according to claim 21,

wherein each of the received control messages shares a destination with at least a corresponding one of the received data packets.

23. A packet processing engine for a provider edge node of a communications network according to claim 19, further comprising:

a circuit filter receiving packet data from an optical connection to the optical communications network;

a circuit filter table operatively connected to said circuit filter, said circuit filter table storing incoming optical circuit connection identification data, encapsulation label data, and outgoing data packet interface identification data;

said circuit filter table extracting the encapsulation label from the received packet data;

said circuit filter using the extracted encapsulation label to identify the received packet data as a control message, wherein the outgoing data packet interface identification data associated with the control message so identified is a host interface,

a packet forwarder operatively connected to said circuit filter, said packet forwarder forwarding the control message to the host interface.

24. A packet processing engine for a provider edge node of a communications network according to claim 19, further comprising:

a circuit filter receiving packet data from an optical connection to the optical communications network;

a circuit filter table operatively connected to said circuit filter, said circuit filter table storing incoming optical circuit connection identification data, encapsulation label data, and outgoing data packet interface identification data;

said circuit filter table extracting the encapsulation label from the received packet data;

said circuit filter using the extracted encapsulation label to identify the outgoing data packet interface associated with the packet data; and

a packet forwarder operatively connected to said circuit filter, said packet forwarder forwarding the packet data to the identified outgoing data packet interface.

25. A packet processing engine for a provider edge node of a communications network according to claim 24,

said circuit filter table further storing overwritten label data for data packets whose encapsulation label has been overwritten;

said circuit filter replacing the overwritten encapsulation label with the encapsulation label originally associated with the data packet.

26. A packet access line module, comprising:

a media access controller receiving/transmitting a client-framed data packet, terminating/originating the client frame, and extracting/inserting the data packet from/to the client-framed data packet;

a packet processing engine according to claim 19 operatively connected to said media access controller; and

a mapping engine operatively connected to said packer processing engine, said mapping engine originating/terminating optical connections.

27. A packet-data-enabled optical connection switch, comprising:

a plurality of packet access line modules according to claim 26,

a time-division-multiplexed switch fabric operatively connected to said packet aware line modules;

a plurality of time-division-multiplexed line modules operatively connected to said time-division-multiplexed switch fabric;

a switch controller operatively connected to said plurality of packet access line modules, said time-division-multiplexed switch fabric, and said time-division-multiplexed line modules.

28. An optical network, comprising:

at least two provider edge nodes operatively connected to a provider network, each of said provider edge nodes including a packet-data-enabled optical connection switch according to claim 27,

at least two client edge nodes each of which is operatively connected to at least one of said provider edge nodes.

29. The optical network according to claim 26, further comprising:

intermediate provider nodes operatively connected to said provider edge nodes in a network configuration.